Exhibit M

UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

COURT FILE NO. 2:21-CV-00316-JRG

FINESSE WIRELESS, LLC,
Plaintiff,
v.
AT&T MOBILITY, LLC,
Defendant.

COURT FILE NO. 2:21-CV-00317-JRG

FINESSE WIRELESS, LLC,
Plaintiff,
v.
CELLCO PARTNERSHIP d/b/a
VERIZON WIRELESS,

Defendant,

NOKIA OF AMERICA CORPORATION,
ERICCSON, INC.,
Intervenors.

TRANSCRIPT DEEMED CONFIDENTIAL, ATTORNEYS' EYES ONLY

REMOTE VIDEOTAPED DEPOSITION OF
FRANCIS J. SMITH

DATE: August 4, 2022
TIME: 10:30 a.m.
PLACE: Veritext Virtual Videoconference
REPORTED BY: Jill Garrison, RPR, Notary Public
VIDEOGRAPHER: Justin Henricksen

optimal.
Q. Okay. Mr. Smith, could we jump over to the '775 patent, please?
A. Certainly.
Q. Sir, just like yesterday, I'm going to be referring to U.S. Patent Number 9,548,775 as your '775 patent.
A. That would be fine.
Q. Okay. And I would like to jump down to the claims in the '775 patent, please.
A. I will go to that page. Okay. Column 16 at the bottom.
Q. That's right.
A. Okay.
Q. So, in Claim 1, the first element reads -- and I am not going to read the whole thing but I will read it in part -- reads, "... generating intermodulation product (IMP) cancellation signals (ICSs) to cancel passive IMPs in the receiver, continuously and near real time, using copies of transmitter signals of the transmitter," and it continues on from there.
A. Okay.
Q. What does it mean to cancel passive IMPs in the receiver continuously and near real time?
A. Yeah, okay. When I'm canceling a signal, if

I'm not canceling it continuously, I'm not cleaning up the signal. I just have snap shots in time and that wouldn't be continuous. So continuous means that it's always converging, it's always canceling on a sample-by-sample basis of the incoming signals.
Rephrase your question to make sure I'm answering the right one.
Q. Well, you're answering my question about continuously. I also do have a question about near real time though.
A. Okay. Near real time, just the fact that you have any processing in a circuit, there is some finite delay. So if I was to say real time, then it would say there was zero delay in all the circuits. But by saying near real time means it's very, very close to real time for all practical purposes. That's normally what's dealt with in the industry, per se. Near real time, it's very, very close to zero delay, but if there is a delay, it is really insignificant.
Q. What would the difference be between near real time and real time?
A. Well, if you actually wanted to push, say, real time, that would mean there were no delays in the circuits whatsoever, which is physically not possible. You've always got the propagation of speed of light.

And speed of light might be so damn close to zero, it is; but technically, it would still be near real time, not zero.
Q. Okay. So, Mr. Smith, I could read the end of the full portion of this element of Claim 1, but instead, I'm going to jump to the bottom of Claim 1.
A. Okay.
Q. The last few clauses.
A. Okay.
Q. So, at the bottom of Column 16, it reads, "wherein generating the ICSs is based on a power series description of a nonlinear process for generating the IMPs, and includes generating an N-th order ICS by, given three signals S1, S2, and S3 digitally multiplying and filtering," and then it continues on from there. I'm not going to read all that into the record because that would hurt our court reporter's fingers, I think.
A. Okay.
Q. Do you see that though in the claim?
A. Yeah, you are actually over on Column 17?
Q. Correct. I went from the bottom of Column 16 to the top of Column 17.
A. Okay. Yeah. Go ahead.
Q. We talked about this a bit yesterday. But can

you describe for me where the claim says "generating the ICSs is based on a power series description of a nonlinear process for generating the IMPs --"
A. Yes --
Q. -- what does that mean?
A. My apology. Go ahead.
Q. I was just finishing my question, which was, what does that mean to you?
A. Okay. Going back to com theory 101 we did yesterday on that paper you had on passive intermodulation which was describing the problem, they show in there that, I think it was equation 2 actually showed a power series expansion and then the co-efficients would be derived based on whatever the curve and shape was. So that's the power series expansion right there from that com theory 101 paper you had.
Q. Got it. And that is a description of a nonlinear process because the nonlinear process is creating the passive IMPs?
A. Whenever you have co-efficients in there that are to any higher order than one, i.e., X-squared, X-cubed, which you have in the power series expansion, you now have a nonlinear process, because those are not lines, they're curves. And you would be -- those are

actually the terms that create the intermods in the process.

Q. Okay. So the claim then continues on and says, "... includes generating an N-th order ICS by, given three signals S1, S2 and S3, digitally multiplying and filtering," and I will paraphrase, combinations of S1, S2 and S3?

A. That's correct; yes.

Q. What are the three signals, S1, S2, and S3?

A. Those three signals can be anything. They can be the same signal, they could be two different signals, they could be three different signals. The bottom line is that to generate a third order intermod, you need three multiplications of three signals. If they're all the same signal, you generate the intermod right on top of the original signal and that's where you get sidelobes on signals. If two of the signals are the same, then you get two F1 plus or minus F2, all of the other things that we covered in the com 101 paper. So you're just multiplying three signals together and they can be anything. If they happen to fall into your signal-of-interest and they're important, then you do something with them. If they don't, then you can just ignore them.

Q. So are the three signals source signals?

A. Yes.

Q. If the --

A. In this paradigm which we have been speaking, yes, they would be source signals that do create intermods in a nonlinear process.

Q. So, let me ask you a couple of questions to try to unpack your prior answer. I think that you said that the three signals can be anything. Did I get that right?

A. That is correct.

Q. But if S1 is S2, a product of S1, S2 wouldn't actually make any intermodulation products that fell anywhere outside of the source signal; right?

A. Incorrect.

Q. Why is that incorrect?

A. Because if S1, S2 are the same signal and you don't have that third signal, then you'll still generate a second linear intermod, not a third. You have to have three notifications, three signals. They can be the same signal; they can be different signals. If they are all the same signal, then yes, the intermod with three times the bandwidth will show up on top of the signal with which we're speaking. Every time you multiply those together, you increase the bandwidth of the intermod.

Q. So if you have a source signal at F1, for example --

A. Yes.

Q. -- and I suppose that's it. And then you're digitally filtering and multiplying S1 by itself two times?

A. Three; got to be three to get a third one.

Q. Three times. I think it was -- I wasn't trying to trick you in that, it was just semantics. I wasn't sure whether the first multiplication counted. Okay. So, let's say that you have effectively S1 times S1 times S1.

A. Uh-huh, correct.

Q. Why would that be anything different than -- I guess, I think you said that the bandwidth would expand in that situation.

A. Every time you multiple signals together or effectively convolve them, you add the bandwidths. So if I have one signal and I use it three times, the bandwidth of the intermod will be three times the bandwidth of that signal. And that is exactly where you generate sidelobes with a single-wide band signal when you saturate an amplifier. It is an intermod floor.

Q. Can you show me where the digital

multiplication and filtering of the source signals is described in the specification?

A. Yes. So, I can show you the block diagram so I can be a little more clear. Okay. If you look at the block diagram on the very first page, the top level. And it gets duplicated later. But if you looked at -- you filter out the source signals and then you --

Q. I apologize, Mr. Smith. I hate to interrupt you, but are you looking at the first page or are you looking at a figure after the first page?

A. I'm looking at a figure on the first page.

Q. Okay. Is there a larger one?

A. Yes, there is; Figure 6.

Q. Okay. Thank you. Okay. So with respect to Figure 6, please continue.

A. Okay. So, first of all, you've got Block Number 6034. From there we've got our programmable filters to isolate the source signals. That's where we get the source signals. Okay? Then in 6035, we multiple these together.

Now, if you remember back to the com theory 101 paper we went through yesterday, you will generate a whole series of intermods when you multiply F1 plus or minus F2 you get the third, the fifth, everything else. So, you generate a whole bunch of signals across that,

which I think was in their Figure 1, if I remember correctly. All right. Then, but I've got all those signals and I really don't want them all. I only want the ones that fall inside the signal-of-interest. So I filter them in 6036 with the signal-of-interest filter so that I only have the intermods that are in-band that I'm concerned about. And then I go into my phase adjustment and canceling circuit. Somehow 6016 lost the summing circuit, it is just a black figure. I don't know why. But that's what's there. Did that answer your question?
Q. I have a couple follow-ups.
A. Okay.
Q. I didn't -- I'm still not seeing the portion of this block diagram where it's describing a single source signal creating intermodulation products?
A. Oh, okay. You come right down below that, which is the second process that can be used, where I've got the signals and I cubed the signal. So, if I have multiple signals in there, I treat them as one signal or as a composite signal. I will generate all the appropriate intermods. And then so that X-cubed, then I go into the signal-of-interest filter and I, again, filter down to the intermods that are important to me and then the down-sampling adjustment is to line

up the samples.
Q. And you were referring there with the X-cubed to Block 6031?
A. That's correct, uh-huh. So, this block diagram actually shows two ways of generating the interference cancellation signals. I can do either one.
Q. Is this process described in the written portion of the specification?
A. Yes, it is.
Q. Can you direct me to that, please?
A. Give me a few minutes. Okay. Go to Column 15, line 37.
Q. Okay.
A. And one embodiment of this invention, the combined signal set from 6023 is up-sampled and cubed to create all of the third order passive intermods. And that's what you see in the block diagram with that X-cubed. It's making all of the signals together as a composite signal, which it can do, as opposed to doing them individually. So the patent calls out doing it both ways.
Q. Is there a reason that -- strike that.
What is the reason to call out three signals S1, S2 and S3 as opposed to 2 or 4 or 5?
A. Because I'm talking about third order intermods

and I need three signals to do that. I need three multiplications. If I have two signals, I will get a second order intermod. I can extend that to five, six, seven signals and get the higher order intermods, or I can use signals one, two, three multiple times and create ninth order intermods. But right here I was talking about how to get to the third order, but it can go to the end if I just multiple them more times. So if I have S1 times S2 times S3 times S3 times S2, I would get a fifth order intermod. And I can carry that out infini up to the higher order as was shown in your com theory 101 paper on the existence of passive intermods. Those are all in there. It's all standard practice.
Q. With respect to Column 15, lines 37 through 44 --
A. Yes.
Q. I'm trying to reference the paragraph you just read from.
A. Okay.
Q. The line numbers and pens don't always line up unfortunately.
A. Truly.
Q. So does this portion discuss having two signals where one of the signals is -- strike that. Let me try

to ask a better question.
Does this portion of the specification describe having two signals, S1 and S2, and then calling one of those two signals S3?
A. It can be. S1, S2 could be the same signal, they could be different signals, they're just three signals used three times. So, if I have S1, S2, S2, then I have F1 plus or minus F2, my vagrancy location. So there is still three multiplications. The fact that a signal is used more than once is standard com theory. It's just three multiplications. It's like we discussed; S1, S2, S3 can all be the same signal and you will still generate a third order intermod, which you multiply it three times.
Q. Where is that described where S1 could be S2 and then you could also have S3?
A. I don't know that I explicitly call that out that it's -- I would say it is totally obvious that there are just three signals and it doesn't say they have to be different signals. There is no reason they can't be the same signal. In fact, if you look at your com theory 101 paper again, going back to that, you know, they deal with three signals. Sometimes they're the same, sometimes they're different. It's just three multiplications.

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Q. Mr. Smith, the portion we read from in the specification on Column 15 is in a section titled, Transmitter Active IMP Cancellations from Transmitted Signals. Do you see that?
A. Yes.
Q. So this section is discussing active IMP cancellation as opposed to passive IMP cancellation; is that right?
A. It kind of looks that way. Let me find the next one.
Q. Mr. Smith, I'm not trying to rush you, but just like yesterday, if there is something you would like me to search for, given that I have an OCR version here, I'd be happy to do that.
A. It's not -- I just need time to read through it very carefully.
Q. Okay.
A. I'm confident that it's here. It's just that you know how patents are.
Q. Sure. Understood.
A. This may take a little while, but I'll try not to take longer than necessary.
Q. Okay. Thank you.
A. Okay. Go to Column 12.
Q. Yes.

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A. Line 32. And if we go through this paragraph, I think this addresses it. "The transmitter active IMP cancellation process generates IMP signals, which they could feed through and you could use them also. When the IMPs are generated in the HPA, they cancel and are cancelled by the ICS. Top level architecture --" Okay. Next one down. "The individual digital signals to be transmitted are received in Block 4023 where they are digitally combined," which makes them one signal, "and block converted to a digital IF or digitally up-converted and then combined. The 4022, the ICS signals are created in one of two ways. If the transmitter will only have a few signals, then the individual signals are digitally multiplied together to create the ICS signals that are inverted and added to the composite signal. The IMP signals will be on the order of 10s of dBs" -- Well, that doesn't matter.
"If there are a large" -- line 50. "If there are a large number of small signals creating the IMP floor, then the composite signal samples from 4023 are cubed and the result filtered to pass only the signals that will be the in the passband of the transmitter. The ICS signals will be cancelled by the IMPs that are generated," if they are not perfect at first. "A calibration loop will then perform a cross-correlation

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of the ICS with the HPA" -- Okay. Not what I was looking for. I will go back and look.
Okay. Also, in Column 14, line 29: "The IMP cancellation in the transmitter and the receiver are fundamentally the same concept, but implemented" what's generally described herein.
So, the whole idea of running the -- of cubing the whole thing -- well, the issue right there in the black diagram, it shows you using on the received path. The same for the transmitter or the receive path, you can generate those signals.
So, when you're multiplying together and putting it through a nonlinear function X-cubed, or if you are using the same signal three times, you're cubing the signal, and if you have a composite signal, it's doing the same thing.
Q. Sir, could you explain a bit more about the argument you just made, which is -- Well, I don't want to mischaracterize your argument. What was your argument with respect to the IMP cancellation being the same in the transmitter or receiver?
A. If I'm trying to pre-compensate for intermods produced by the transmitter signals in-band, I get the signals and cube them. I do the same thing in Figure 6 where I show the signals being cubed as a composite

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signal. So, whether I'm doing composite signals or an intermod cancellation in the transmitter or I'm doing composite signals, it's the same technique and the same algorithm on both.
Q. So, are you saying that Figure 6 is in the context of pre-distortion of the transmitter?
A. Figure 6 is in the concept of cleaning it up in the receiver by taking the signals and cubing them. Same thing could be done on the transmit. Figure 6 shows it on the receive side, because I'm receiving the transmit/receive signals in 6037, sampling them and then up-sampling by 3X just so it's -- I have resolution, and then cubing the signals, which is cubing the composite signal because they're all mixed in there together. So the concept of combining the signals and treating them as one signal and then cubing them or putting them through a nonlinear function, whether it's on the transmitter or receive side is the same algorithm. Figure 6 shows doing it on the receive side.
Q. Okay. I would like to go back down to Column 12 --
A. Okay.
Q. -- if you could. That's where you directed me to earlier.